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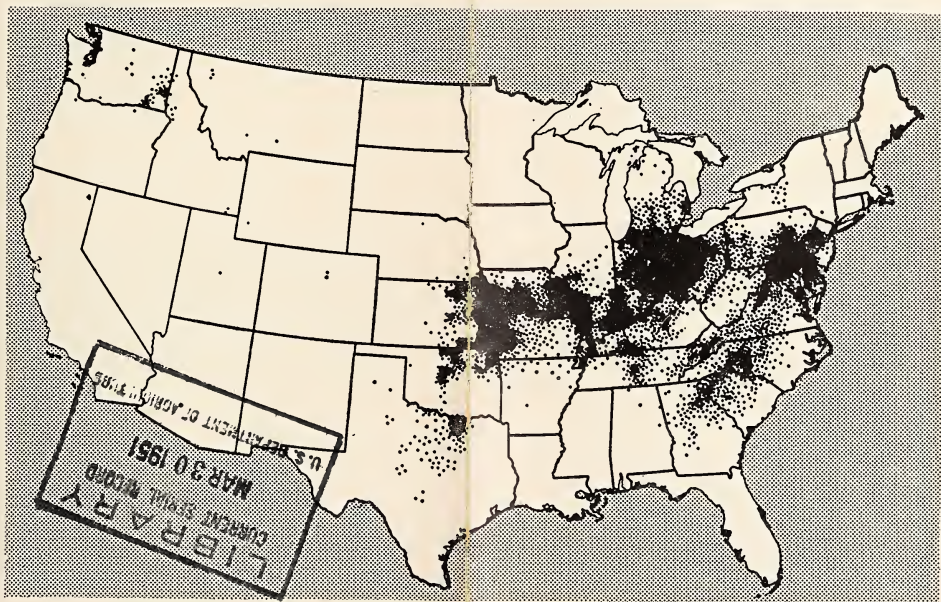
NOTE.—For more information about wheat, see your county agricultural agent or write to your State agricultural college.

Licensed grain inspectors and Federal grain supervisors of the U. S. Department of Agriculture, located in the larger markets, can give you further advice on grading wheat.

Ag 844  
Cap 5

# GRADING SOFT RED WINTER WHEAT

at country  
points



U. S. DEPARTMENT OF AGRICULTURE  
EXTENSION SERVICE  
Washington, D. C.

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## GRADING SOFT RED WINTER WHEAT AT COUNTRY POINTS

The old saying that "wheat is wheat" often has been given as a reason why every bushel of wheat should sell at the same price. But farmers know that higher prices are paid for the better grades of many farm products, and Soft Red Winter wheat is no exception; some lots are worth more than others.

Soft Red Winter wheat is grown principally in the subhumid to humid areas in the eastern half of the United States, and on a small acreage in the Pacific Northwest. In nearly all of this area the average annual rainfall is at least 30 inches.

About one-fifth of the total wheat crop in the United States is of the Soft Red Winter class. This class includes over 60 varieties of wheat, among them Fultz, Trumbull, Fulcaster, Fulhio, Leap, Red May, Nittany, Poole, Forward, Early Premium, Clarkan, Wabash, Thorne, and Fairfield.

Soft Red Winter wheat in general is softer in texture and lower in protein content than are the hard wheats grown in the Great Plains region. The differences in texture are due primarily to variety, but climate and soil are also important. The differences in protein content are due primarily to climate and soil, but variety also has an

most desired for milling and for making breakfast cereals.

This pamphlet shows how the grading is done and tells some things farmers can do to have better wheat to sell.

### How Wheat Is Graded

**1. A sample.**—Start with a fair and average sample of the wheat, drawn with a grain trier or probe.

**2. Odor.**—Smell the sample. Wheat that smells musty or sour, or of creosote from tar paper, or that has other objectionable odor from storage near oil or fertilizer, is classed as Sample grade. Wheat that is heating is also classed as Sample grade (fig. 1).



Figure 1

Farmers who have tried to store damp wheat may find later that it has a musty or a sour odor; also, that the grain may be heating from spoilage and have a bitter taste.

To avoid grade losses from bad odors and heating, harvest the grain when dry and store it in thoroughly cleaned bins. Or, if the wheat is not dry, store it in well-ventilated bins, and "turn" it if heating begins. Wheat should never be placed near hides, fertilizer, or kerosene, as the grain will absorb odors from such things.

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## HOW TO GROW WHEAT

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- 2. USE GOOD, CLEAN SEED.**—Your own State agricultural college and county agricultural agent
- 3. TREAT THE SEED.**—Follow the recommendations of your State agricultural college and county agent
- 4. USE FERTILIZER AND PLANT SEED AT THE PROPER TIME.**—These will vary according to
- 5. HARVEST CAREFULLY.**—Combine or thresh only when the grain is dry. See that weed screens
- 6. WATCH GRAIN IN STORAGE.**—Be on the lookout for insects and signs of heating.
- 7. KNOW THE VARIETY AND GRADE OF THE WHEAT YOU PRODUCE.**—This

are used to remove dirt, weed seeds, straws, and like material before any more tests are made in grading the wheat. The material taken out of the sample by screens is known as dockage. Dockage is indicated as so many parts in a hundred. For example, if 100 bushels of wheat "sold in the dirt" has 2 percent dockage, the owner would be paid for 98 bushels of wheat.

### A Dockage Test

Grain-inspection departments and many country elevator operators make the dockage test with a machine. If a dockage machine is not available, a satisfactory test can be made with hand sieves.

If coarse material, such as straws, sticks, oats, or corn is contained in the sample, work it over a sieve having round holes twelve sixty-fourths of an inch across. The coarse material (fig. 2) taken off by the sieve or scalper is put to one side for the time being, and a further cleaning of the sample is done with the fine-seed sieve (fig. 3). This sieve has holes one-twelfth of an inch across and removes fine dockage material (fig. 4).



not cause the wheat to be put in a lower grade, but it is a weight-deduction factor.

**7. Other foreign material.**—The dockage sieves do not take out some foreign seeds, such as those of rye or cockle, which are about the same size as wheat kernels. This foreign matter remaining in the cleaned wheat will grade the sample below No. 1 if more than 1 percent is present, and below No. 2 if more than 2 percent is present. The percentage of such foreign material other than dockage is determined by analyzing a part of the sample after the dockage has been removed.

These limits of 1 and 2 percent include cereal grains such as rye (fig. 5) and weed seeds, sticks, and other noncereal matter (fig. 6) in the cleaned or dockage-free sample. (Smut balls are not considered foreign material.)

Weed seeds and inert matter lower the value of the wheat for milling much more than a like quantity of cereal grains would. For this reason, special limitations are provided in the grades for "matter except other grains."

This limitation is one-half percent in the No. 1 grade and 1 percent in the No. 2 grade.

Having clean fields is an advantage to the farmer not only in doing away with dockage, but also in keeping rye or weed seeds

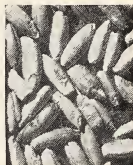


Figure 5

## THAT WILL GRADE HIGH

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## HOW TO GROW WHEAT THAT WILL GRADE HIGH

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3. TREAT THE SEED.—Follow the recommendations of your State agricultural college and county agent.
4. USE FERTILIZER AND PLANT SEED AT THE PROPER TIME.—These will vary according to locality. Consult your county agent or State agricultural college.
5. HARVEST CAREFULLY.—Combine or thresh only when the grain is dry. See that weed screens in the thresher or combine work properly and collect weed seeds, to avoid reseeding the land with them.
6. WATCH GRAIN IN STORAGE.—Be on the lookout for insects and signs of heating.
7. KNOW THE VARIETY AND GRADE OF THE WHEAT YOU PRODUCE.—This information will help you in selling your grain.



## GRADING SOFT RED WINTER WHEAT AT COUNTRY POINTS

The old saying that "wheat is wheat" often has been given as a reason why every bushel of wheat should sell at the same price. But farmers know that higher prices are paid for the better grades of many farm products, and Soft Red Winter wheat is no exception; some lots are worth more than others.

Soft Red Winter wheat is grown principally in the subhumid to humid areas in the eastern half of the United States, and on a small acreage in the Pacific Northwest. In nearly all of this area the average annual rainfall is at least 30 inches.

About one-fifth of the total wheat crop in the United States is of the Soft Red Winter class. This class includes over 60 varieties of wheat, among them Fultz, Trumbull, Fufcaster, Fulhio, Leap, Red May, Nittany, Poole, Forward, Early Premium, Clarkan, Wabash, Thorne, and Fairfield.

Soft Red Winter wheat in general is softer in texture and lower in protein content than are the hard wheats grown in the Great Plains region. The differences in texture are due primarily to variety, but climate and soil are also important. The differences in protein content are due primarily to climate and soil, but variety also has an effect. These softer wheats produce fine pastry flour. Excellent bread flour, however, can be made from most varieties of Soft Red Winter and from blends of Soft Red Winter and hard wheats.

### Hard Winter Wheat in the Soft Winter Area

Some Hard Red Winter wheats, because of their ability to survive cold, are grown in certain parts of the eastern United States. As compared with those of soft wheats, the yields of these harder wheats are higher in hot, dry seasons and after severe winters in which damage occurs. In wet seasons the hard wheat varieties are likely to lodge and produce low yields. Also, the grain produced under these conditions usually has a mottled appearance known as yellow berry. These Hard Red Winter wheats are not so satisfactory for bread flour as the grain of similar varieties from the Great Plains, or so suitable for pastry flour as the true soft wheats.<sup>1</sup>

Certain varieties of Soft Red Winter wheat are especially desired by soft-wheat millers. The selection of a variety is important when Soft Red Winter wheat is produced for the market.

But the variety is not the only thing those who use and store wheat must consider. Important also are the ways to measure the dryness and plumpness of the wheat and to tell whether the grain is in sound and clean condition so that it will give good results when used in the mill or on the farm.

To measure some of the things that influence its keeping quality and usefulness, wheat is graded. The six grades are No. 1, No. 2, No. 3, No. 4, No. 5, and Sample. Sample grade is the lowest. No. 1 and No. 2 are the grades

most desired for milling and for making breakfast cereals.

This pamphlet shows how the grading is done and tells some things farmers can do to have better wheat to sell.

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Figure 1

Formers who have tried to store damp wheat may find later that it has a musty or a sour odor; also, that the grain may be heating from spoilage and have a bitter taste.

To avoid grade losses from bad odors and heating, harvest the grain when dry and store it in thoroughly cleaned bins. Or, if the wheat is not dry, store it in well-ventilated bins, and "turn" it if heating begins. Wheat should never be placed near hides, fertilizer, or kerosene, as the grain will absorb odors from such things.

3. **Insects.**—Look the sample over for live weevils, bran bugs, moths, mealworms, or other insects harmful to wheat. Wheat infested with such insects has the word "Weevily" added to the grade designation.

Insect damage can be controlled by the same harvesting and storage practices that prevent bad odors and by using some good fumigant to kill the insects.

4. **Garlic.**—Wild garlic and onion bulblets are found in Soft Red Winter wheats in the Ohio Valley and in the Piedmont section of the Eastern States. Such wheat has "Light Garlicky" or "Garlicky" added to the grade designation, depending on the number of bulblets in the sample. In recent years 3 to 4 percent of the wheat in the Soft Red Winter class has been found to be light garlicky and 20 to 30 percent garlicky.

Garlic contamination can be held down by the use of garlic-free seed, by winter plowing, and by crop rotation.

5. **Smut.**—A successful job of smut elimination in the principal Soft Red Winter wheat areas has been accomplished through seed treatment and the planting of resistant varieties. When wheat has an unmistakable odor of smut or when the dockage-free sample has more than 14 smut balls in 250 grams of wheat it is smutty. East of the Rocky Mountains, "Light Smutty" or "Smutty" is added to the grade designation, depending on the quantity of smut present. In the Far Western States smutty wheat is placed in a laboratory wheat scouter, where the smut is removed and the loss in weight caused by this removal of the smut is assessed as smut dockage.

6. **Dockage.**—Up to the point where the aid of some special screens or sieves is needed, most samples are graded by sight and smell. Sieves

are used to remove dirt, weed seeds, straws, and like material before any more tests are made in grading the wheat. The material taken out of the sample by screens is known as dockage. Dockage is indicated as so many parts in a hundred. For example, if 100 bushels of wheat "sold in the dirt" has 2 percent dockage, the owner would be paid for 98 bushels of wheat.

### A Dockage Test

Grain-inspection departments and many country elevator operators make the dockage test with a machine. If a dockage machine is not available, a satisfactory test can be made with hand sieves.

If coarse material, such as straws, sticks, oats, or corn is contained in the sample, work it over a sieve having round holes twelve sixteenths of an inch across. The coarse material (fig. 2) taken off by the sieve or scalper is put to one side for the time being, and a further cleaning of the sample is done with the fine-seed sieve (fig. 3). This sieve has holes one-twelfth of an inch across and removes line dockage material (fig. 4).



Figure 2



Figure 3



Figure 4

If shrunken or broken kernels of wheat are removed with the screenings, the screenings are run over the sieve again. The shriveled wheat remaining on top of the sieve after this rescreening is returned to the cleaned sample.

There are also special slotted sieves for taking out chaff (chess).<sup>2</sup>

The final step in this test is to weigh all dockage removed and compute the percentage. Less than 1 percent dockage is disregarded. Dockage does

<sup>2</sup> **SUPPLEMENTARY SIEVING OF WHEAT CONTAINING CHESS.**—When the original sample of wheat contains more than 0.5 percent of chess, quackgrass, or other weed seeds of similar size and shape, dockage should first be removed with the scalper sieve and the  $\frac{1}{2}$ -inch round-hole sieve. The wheat so cleaned is screened further with the large chess hand sieve. A portion of approximately 250 grams of the sample is placed on the hand sieve and worked back and forth lengthwise of the slots until all the removable material has passed through the sieve. The operation is continued with similar-sized portions until the entire sample has been sieved.

The wheat that remains in the material passing through the hand chess sieve is then reclaimed in the following way: The hand sieve having  $\frac{1}{2}$ -inch round-hole perforations (fine-seed sieve) is held at an angle of from 10° to 20°; the material is placed on the lower edge of the sieve and the lower edge of the sieve is struck with one hand in such a way as to cause the material to bounce up and down. This will cause the chess, etc., to open up and pass through the perforations of the sieve. The operation is continued until all the separable dockage material has passed through the sieve.

The material remaining on top of the fine-seed hand sieve is returned to the cleaned wheat. If the material that passes through the fine-seed sieve in the reclaiming process consists of 50 percent or more of whole or broken kernels of wheat, it is put back in the cleaned wheat; otherwise it is added to the dockage material previously obtained.

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not cause the wheat to be put in a lower grade, but it is a weight-deduction factor.

7. **Other foreign material.**—The dockage sieves do not take out some foreign seeds, such as those of rye or cockle, which are about the same size as wheat kernels. This foreign matter remaining in the cleaned wheat will grade the sample below No. 1 if more than 1 percent is present, and below No. 2 if more than 2 percent is present. The percentage of such foreign material other than dockage is determined by analyzing a part of the sample after the dockage has been removed.

These limits of 1 and 2 percent include cereal grains such as rye (fig. 5) and weed seeds, sticks, and other noncereal matter (fig. 6) in the cleaned or dockage-free sample. (Smut bolls are not considered foreign material.)

Weed seeds and inert matter lower the value of the wheat for milling much more than a like quantity of cereal grains would. For this reason, special limitations are provided in the grades for "matter except other grains."

This limitation is one-half percent in the No. 1 grade and 1 percent in the No. 2 grade.

Having clean fields is an advantage to the farmer not only in doing away with dockage, but also in keeping rye or weed seeds out of the wheat. These seed mixtures cause the wheat to be graded lower and are difficult to clean out of the wheat at the mill.

Both dockage and other foreign material can be held down by many of the farm practices already recommended and also by clean threshing.

8. **Test weight.**—High-grade wheat is plump and heavy. A brass quart measure and beam are used in making the proper weight-per-bushel test (fig. 7). The No. 1 grade must test at least 60 pounds and the No. 2 grade at least 58 pounds to the bushel. This test is made on dockage-free wheat.

Test weight may be increased by various good farm practices. The variety of wheat selected, the proper use of fertilizer, disease- and insect-control measures, and good harvesting and storage methods all contribute to heavier weight-per-bushel wheat.

9. **Moisture.** Wheat must be dry to keep from spoiling in the bin.

Tests for moisture in wheat are made with moisture machines after dockage has been removed (fig. 8).

In grading Soft Red Winter wheats, 14 percent moisture is allowed in grades No. 1 to No. 5. When moisture is more than 14 percent, but not more than 15½, the word



Figure 5

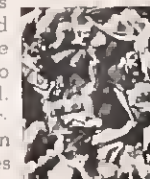


Figure 6



Figure 7



Figure 8

<sup>1</sup> See Farmers' Bulletin 1817, Growing Wheat in the Eastern United States.

"Tough" is added to the grade; as No. 1 Red Winter, Tough. When the moisture exceeds 15½ percent, the wheat is classed as Sample grade without "Tough" being added; as Sample Grade Red Winter. The percentage of moisture is added under remarks on the inspector's certificate of grade.

**10. Damaged Kernels.**—A part of the dockage-free grain is looked over for damage (fig. 9). One kind of injury is caused by heat from grain spoilage and is known as heat damage (fig. 10). Other damage is caused by sprouting, disease and molds (figs. 11 and 12). Certain insects such as weevils also cause injury to grain by boring into the kernels (fig. 13). More wheat is damaged in storage than in the field.



Figure 9



Figure 10

The No. 1 grade allows 2 percent damaged kernels, of which one-tenth of 1 percent may be heat-damaged. The No. 2 grade allows 4 percent damage, of which two-tenths of 1 percent may be heat-damaged.



Figure 11



Figure 12



Figure 13

**11. Wheats of other classes.**—A mixture of more than 10 percent of other classes will cause a sample to fail in the Mixed wheat class. Two classes of wheat, Hard Red Winter (fig. 14a) and Soft Red Winter (fig. 14b), are shown here.

In grades No. 1 to No. 3 there are also special limitations for Durum mixtures. No. 1 may contain not more than one-half of 1 percent of Durum wheats, which are usually hard and flinty. (See table.)



Figure 14

**12. Subclasses.**—Soft Red Winter wheats consisting of both light-colored and dark-colored

kernels are classified as Red Winter unless grown west of the Great Plains area, when they are classified as Western Red.

Your local grain dealer, who is in touch daily with terminal grain markets, can show you more about the grading of wheat in your community and the market demands for the different varieties and grades.

## High-grade Soft Red Winter wheat—

Has a good natural odor.

Is dry and clean, plump and heavy.

Is not mixed with wheat of another class.

Does not contain damaged or shrunk kernels.

Is free of smut and injurious insects.

Is of a desirable variety.

## Class V.—Soft Red Winter Wheat

### Grade requirements for Red Winter and Western Red

Grade No.	Minimum test weight per bushel		Damaged kernels (wheat and other grains)		Foreign material		Wheats of other classes	
			Total	Heat-damaged	Total	Matter except other grains	Total	Durum and/or Red Durum
	Lb.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
1	60	2	0.1	1	0.5	5	0.5	
2	58	4	.2	2	1.0	10	1.0	
3	56	7	.5	3	2.0	10	2.0	
4	54	10	1.0	5	3.0	10	10.0	
5	51	15	3.0	7	5.0	10	10.0	
Sample grade.	Sample grade shall include wheat of the subclass Red Winter, or Western Red, which does not come within the requirements of any of the grades from No. 1 to No. 5, inclusive; or which contains more than 15.5 percent of moisture; or which contains in-separable stones and/or cinders; or which is musty, or sour, or heating, or hot; or which has any commercially objectionable foreign odor except of smut or garlic; or which contains a quantity of smut so great that any one or more of the grade requirements cannot be applied accurately; or which is otherwise of distinctly low quality.							

<sup>1</sup> The wheat in grades No. 1 and No. 2 of this class may contain not more than 7 percent, and the wheat in grade No. 3 of this class may contain not more than 10 percent, of shrunken and/or broken kernels of grain and other matter that will pass through a 20-gage metal sieve with slotted perforations 0.064 inch wide and 3/8-inch long.

## References

- For complete standards, see:  
 COMBS, W. B., and SMITH, P. G. GRAIN GRADING PRIMER. U. S. Dept. Agr. Misc. Pub. 325, 48 pp., illus. 1940. Revised.  
 UNITED STATES DEPARTMENT OF AGRICULTURE. HANDBOOK OF OFFICIAL GRAIN GRADING STANDARDS OF THE UNITED STATES. U. S. Dept. Agr. Off. Distrib. Unnum. Pub. 101 pp., illus. 1950. Revised.